AF

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS

In re Patent Application of:)	
NORDSTROM ET AL.)	
)	
Serial No. 09/555,816)	Examiner: B. HOFFMAN
)	
Confirmation No: 9460)	Art Unit: 2136
)	
Filing Date: OCTOBER 10, 2000)	
)	
For: DATA SCRAMBLERS)	
)	

APPELLANT'S SUPPLEMENTAL APPEAL BRIEF

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith is Appellant's Supplemental Appeal Brief. If any additional extension and/or fee is required, authorization is given to charge Deposit Account No. 01-0484.

(1)-(4) *See Appellant's Brief.*

(5) **SUMMARY OF CLAIMED SUBJECT MATTER**

As described on page 5, line 9 through page 7, line 1 of the specification with reference to FIG. 1 (reproduced below), the disclosed invention is directed to multi-carrier transmission systems, including copper based transmission systems such as ADSL, VDSL and HDSL which use DMT and/or radio based transmission systems using OFDM. More specifically, the invention is directed to data scramblers, descramblers, systems and methods making use of the synchronization frames, normally used for measuring channel characteristics, as a source of pseudo-random data that is combined with user data.
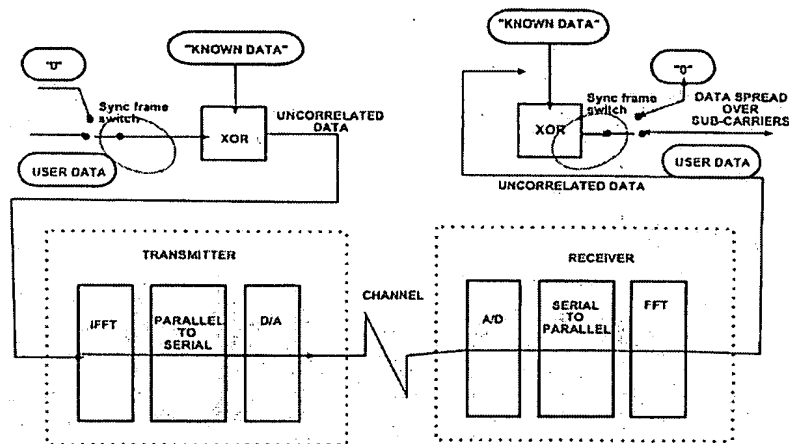
FIGURE 1

Most telecommunications transmission systems are designed to give optimum performance when uncorrelated data is transmitted over the system. Unfortunately, user data is not usually uncorrelated and may, for example, include relatively long strings of binary "0"s, or "1"s. If such data is transmitted over a transmission system intended for uncorrelated data, it can result in saturation, i.e. too large a dynamic range, synchronization drift, etc. This problem has long been recognized by telecommunications engineers and the conventional approach is to scramble the incoming user data so that it behaves as though it was uncorrelated data. Known data scramblers use a process to combine user data with a random data string, thereby producing an uncorrelated data stream for transmission.

The present invention simplifies known data scramblers by making use of the synchronization frames, normally used for measuring channel characteristics, as a source of pseudo-random data which can be combined with

- 2 -

incoming user data. The present invention includes multi-
carrier transmission systems which use, for example, DMT, or
OFDM. Many of these transmission systems send known data,
usually referred to as synchronization frames, to measure
channel characteristics such as signal to noise ratio. The
known data contained in a synchronization frame is selected to
have a suitable statistical distribution, e.g. pseudo-random.
In the data scrambler of the present invention, user data bits
are combined with the known synchronization frame data,
typically the two most significant bits, using an exclusive-OR
function. This results in a statistically and computationally
efficient scrambling of the user data.

The present invention results in a much improved
statistical distribution of modulated sub-carriers, in a
multi-carrier transmission system, compared to the case where
no scrambling is used for correlated, or null data situations.

The Claims on appeal include independent Claims 24,
28, 32, 37 and 41. Independent Claim 24 is directed to a data
scrambler, for use in a multi-carrier transmission system in
which synchronization frame data is periodically transmitted
from a transmitter to a receiver to measure transmission
channel characteristics, the data scrambler comprising a
combiner unit to combine user data with frame synchronization
data. Similarly, independent Claim 28 is directed to a data
descrambler comprising a second combiner unit to combine
received data with frame synchronization data.

Independent Claim 32 is directed to a multi-carrier
transmission system comprising a receiver, a transmitter to
periodically transmit synchronization frame data to the
receiver to measure transmission channel characteristics, and

- 3 -

a data scrambler connected to the transmitter and comprising a
combiner unit to combine user data with frame synchronization
data. Independent Claim 37 recites a method of scrambling user
data prior to transmission in a multi-carrier transmission
system in which synchronization frame data is periodically
transmitted from a transmitter to a receiver to measure
transmission channel characteristics. The method includes
combining user data with frame synchronization data to define
scrambled data, and transmitting the scrambled data to the
receiver. Likewise, independent method Claim 41 recites
receiving the scrambled data, and combining the scrambled data
with frame synchronization data.

(6)   GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

In response to the arguments presented in
Appellant's Brief filed June 15, 2004, the Examiner has
withdrawn the previous rejection. Claims 24-46 now stand
rejected under 35 U.S.C. §103 over Kloker (U.S. Patent No.
4,539,684) in view of Isaksson et al. (WIPO 9503656).

(7)   ARGUMENT

Claims 24-46 were rejected in view of Kloker (U.S.
Patent No. 4,539,684) in view of Isaksson et al. (WIPO
9503656) for the reasons set forth in the Office Action mailed
July 14, 2004. Appellants contend that Claims 24-46 clearly
define over the cited references, and in view of the following
remarks, reversal of the Examiner's decision including the
rejection under 35 U.S.C. §103 is requested. Independent
Claims 24, 28, 32, 37 and 41 stand together. Dependent Claims
27, 31, 40 and 44 are argued separately below.

- 4 -

In re Patent Application of:
NORDSTROM ET AL.
Serial No: 09/555,816
Filing Date: October 10, 2000
_____/

     Kloker is directed to a communication system including an encoder and decoder for the transmission of digital information over a transmission medium. The system has frame synchronization and error correction. The encoder processes a data stream and generates a transmission bit stream of N bits using convolutional encoding, auto-synchronization sequence combining, and bit interleaving. However, as correctly recognized by the Examiner, Kloker is <u>not</u> directed to a multi-carrier transmission system. The Examiner has cited Kloker for the use of an auto-synchronization sequence combined with input data <u>to reduce the transmission bit stream</u> and obtain frame synchronization at the receiver using a multiphase sequential decoder, as shown, for example, in FIG. 3 of Kloker (reproduced below).

Fig. 3
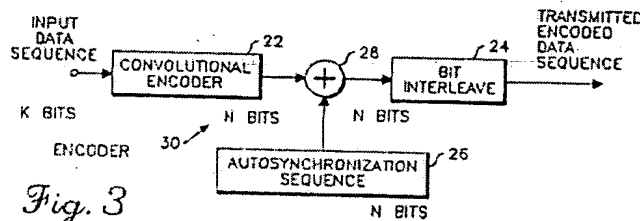
     However, there is nothing in Kloker that teaches or suggests that such a bit stream reducing process would be desirable in a data scrambler or descrambler of a multi-carrier transmission system using, for example, DMT, or OFDM. The Examiner has relied upon the reference to Isaakson et al. to allegedly make up for the deficiencies of Kloker.

     The Isaksson et al. reference is a published Telia application and relates to a method and apparatus for synchronization of transmitters and receivers in OFDM type digital transmission systems. The system uses an FFT

- 5 -

technique to carry out the modulation and demodulation procedures. The transmitter sends synchronization frames with known frequencies and phase positions and with known time intervals in certain time slots. The receiver carries out a series of time shifted FFT operations over the time position where the synchronization frame is calculated to be. However, there is no teaching of a scrambler, descrambler or the use of any synchronization frames, normally used for measuring channel characteristics, as a source of pseudo-random data which can be combined with incoming user data. Moreover, there is no discussion of any need, desire or problem whatsoever associated with an uncorrelated data stream for transmission.

As such, Appellants maintain that the Examiner is impermissibly using the teachings of Appellants' own patent application as a roadmap to modify the prior art. For example, as noted above, the method and apparatus of Isaakson et al. does not discuss or teach the use of a scrambler, descrambler or any synchronization frames as a source of pseudo-random data. Also, Kloker is concerned with reducing the length of the transmission bit stream and <u>not</u> with producing an uncorrelated data stream for transmission in a multi-carrier transmission system.

Additionally, with respect to Claims 27, 31, 40 and 44, Appellants point to pages 4-5 of the most recent Office Action as further evidence of the Examiner's hindsight reasoning in making the obviousness rejection. Indeed, such dependent claims set forth the feature of the <u>two most significant bits of the frame synchronization data</u> are combined with user data in the combiner unit of the data scrambler or descrambler. As discussed in the specification

- 6 -

(e.g. page 2, lines 4-7), <u>it was the Appellants that
discovered that this results in a statistically and
computationally efficient scrambling of the user data</u>. In the
previous Final Office Action, the Examiner provided no
rationale or teaching for rejecting such claims, but instead
provided the impermissible speculation that "any combination
of bits…would produce similar results." Now, in the current
office action, the Examiner takes "Official Notice" of a
combiner combining user data with the two most significant
bits of a synchronization frame.

  As discussed in MPEP §2144.03, any rejection based
on assertions that a fact is well-known or is common knowledge
in the art without documentary evidence to support the
Examiner's conclusion should be judiciously applied.
Furthermore, any facts so noticed should be of notorious
character and serve only to "fill in the gaps" in an
insubstantial manner which might exist in the evidentiary
showing made by the Examiner to support a particular ground
for rejection. It is never appropriate to rely solely on
common knowledge in the art without <u>evidentiary support in the
record</u> as the principal evidence upon which a rejection was
based.

  The Examiner explains, for some unknown reason, the
difference between using the two most significant bits versus
using the least significant bits, before erroneously alleging
that "EXCLUSIVE-ORing the two most significant bits provides
the most amount of uncorrelated data." However, as the
Examiner and Board are aware, Official notice unsupported by
documentary evidence should only be taken by the Examiner
where the facts asserted to be well-known, or to be common

- 7 -

knowledge in the art are capable of <u>instant and unquestionable</u>
<u>demonstration</u> as being well-known. It was the Appellants that
discovered that two most significant bits of the frame
synchronization data being combined with user data in the
combiner unit of the data scrambler or descrambler results in
a statistically and computationally efficient scrambling of
the user data. The Examiner has not provided any evidentiary
support of a combiner unit of a data scrambler or descrambler
combining the two most significant bits of the frame
synchronization data with user data.

As the Examiner and Board are aware, to establish a
prima facie case of obviousness, three basic criteria must be
met. First, there must be some suggestion or motivation,
either in the reference itself or in the knowledge generally
available to one of ordinary skill in the art, to modify the
reference. Second, there must be a reasonable expectation of
success. Finally, the prior art reference must teach or
suggest all the claim features. The initial burden is on the
Examiner to provide some suggestion of the desirability of
doing what the Appellants have done. To support the conclusion
that the claimed invention is directed to obvious subject
matter, either the reference must expressly or impliedly
suggest the claimed invention or the Examiner must present a
convincing line of reasoning as to why the artisan would have
found the claimed invention to have been obvious in light of
the teachings of the reference. Both the suggestion to make
the claimed combination and the reasonable expectation of
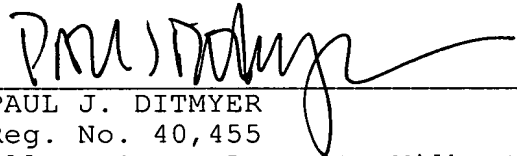success must be founded in the prior art and not in
Appellants' disclosure.

- 8 -

There is simply no teaching or suggestion in the cited references to provide the combination of features as claimed. Accordingly, for at least the reasons given above, Appellants maintain that the cited references do not disclose or fairly suggest the invention as set forth in Claims 24-46. Furthermore, no proper modification of the teachings of these references could result in the invention as claimed. Thus, the rejections under 35 U.S.C. §103(a) should be withdrawn.

CONCLUSIONS

In view of the substantive arguments presented above, it is submitted that all of the claims, namely Claims 24-46, are patentable over the prior art. Accordingly, Appellants respectfully request that all of the rejections be reversed.

Respectfully submitted,

PAUL J. DITMYER
Reg. No. 40,455
Allen, Dyer, Doppelt, Milbrath
    & Gilchrist, P.A.
255 S. Orange Avenue, Suite 1401
Post Office Box 3791
Orlando, Florida 32802
407-841-2330
Attorney for Appellants

In re Patent Application of:
NORDSTROM ET AL.
Serial No: **09/555,816**
Filing Date: **October 10, 2000**
_____/

APPENDIX INCLUDING THE CLAIMS ON APPEAL

FOR U.S. PATENT APPLICATION SERIAL NO. 09/555,816

24. (previously presented) A data scrambler, for use in a multi-carrier transmission system in which synchronization frame data is periodically transmitted from a transmitter to a receiver to measure transmission channel characteristics, the data scrambler comprising a combiner unit to combine user data with frame synchronization data.

25. (previously presented) A data scrambler as claimed in Claim 24, wherein the combiner unit comprises an exclusive OR (XOR) combiner unit.

26. (previously presented) A data scrambler as claimed in Claim 24, wherein the frame synchronization data is pseudo-random.

27. (previously presented) A data scrambler as claimed in Claim 24, wherein the combiner unit combines the user data with the two most significant bits of a synchronization frame of the frame synchronization data.

28. (previously presented) A data descrambler, for use in a multi-carrier transmission system in which synchronization frame data is periodically transmitted from a transmitter to a receiver to measure transmission channel characteristics, and transmitted data is scrambled using a data scrambler comprising a first combiner unit to combine

user data with frame synchronization data, the data descrambler comprising a second combiner unit to combine received data with frame synchronization data.

29. (previously presented) A data descrambler as claimed in Claim 28, wherein the second combiner unit comprises an exclusive OR (XOR) combiner unit.

30. (previously presented) A data descrambler as claimed in Claim 28, wherein the frame synchronization data is pseudo-random.

31. (previously presented) A data descrambler as claimed in Claim 28, wherein the second combiner unit combines the received data with the two most significant bits of a synchronization frame of the frame synchronization data.

32. (previously presented) A multi-carrier transmission system comprising:
a receiver;
a transmitter to periodically transmit synchronization frame data to the receiver to measure transmission channel characteristics; and
a data scrambler connected to the transmitter and comprising a combiner unit to combine user data with frame synchronization data.

33. (previously presented) A multi-carrier transmission system as claimed in Claim 32, further comprising a data descrambler connected to the receiver and comprising a

second combiner unit to combine received data with frame
synchronization data.

34. (previously presented) A multi-carrier
transmission system as claimed in Claim 32, wherein said
multi-carrier transmission system is a discrete multi-tone
(DMT) system.

35. (previously presented) A multi-carrier
transmission system as claimed in Claim 32, wherein said
multi-carrier transmission system is an orthogonal frequency
division multiplex (OFDM) system.

36. (previously presented) A multi-carrier
transmission system as claimed in Claim 32 further comprising
means for transmitting frame synchronization data from the
data scrambler to the data descrambler.

37. (previously presented) A method of scrambling
user data prior to transmission in a multi-carrier
transmission system in which synchronization frame data is
periodically transmitted from a transmitter to a receiver to
measure transmission channel characteristics, the method
comprising:
        combining user data with frame synchronization data
to define scrambled data; and
        transmitting the scrambled data to the receiver.

38. (previously presented) A method as claimed in
Claim 37, wherein combining user data with frame

synchronization data comprises performing an exclusive OR
(XOR) operation.

39. (previously presented) A method as claimed in
Claim 37, wherein the frame synchronization data is pseudo-
random.

40. (previously presented) A method as claimed in
Claim 37, wherein combining user data with frame
synchronization data comprises combining the two most
significant bits of a synchronization frame.

41. (previously presented) A method of descrambling
scrambled data in a multi-carrier transmission system in which
synchronization frame data is periodically transmitted from a
transmitter to a receiver to measure transmission channel
characteristics, the scrambled data comprising user data
having been combined with frame synchronization data, the
method comprising:
        receiving the scrambled data; and
        combining the scrambled data with frame
synchronization data.

42. (previously presented) A method as claimed in
Claim 41, wherein combining scrambled data with frame
synchronization data comprises performing an exclusive OR
(XOR) operation.

43. (previously presented) A method as claimed in
Claim 41, wherein the frame synchronization data is pseudo-

random.

    44. (previously presented) A method as claimed in Claim 41, wherein combining scrambled data with frame synchronization data comprises combining the two most significant bits of a synchronization frame.

    45. (previously presented) A method as claimed in Claim 41, wherein the multi-carrier transmission system is a discrete multi-tone (DMT) system.

    46. (previously presented) A method as claimed in Claim 41, wherein said multi-carrier transmission system is an orthogonal frequency division multiplex (OFDM) system.

In re Patent Application of:
NORDSTROM ET AL.
Serial No: **09/555,816**
Filing Date: **October 10, 2000**
_____/

<u>EVIDENCE APPENDIX</u>

In re Patent Application of:
NORDSTROM ET AL.
Serial No: **09/555,816**
Filing Date: **October 10, 2000**
_____/

RELATED PROCEEDINGS APPENDIX
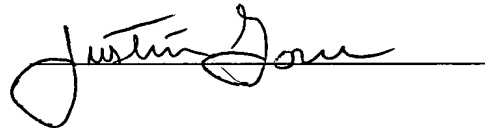
In re Patent Application of:
NORDSTROM ET AL.
Serial No: **09/555,816**
Filing Date: **October 10, 2000**
_____/

CERTIFICATE OF FACSIMILE TRANSMISSION

I HEREBY CERTIFY that the foregoing correspondence has been forwarded via facsimile number 703-872-9306 to: "Mail Stop Appeal Brief-Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 14TH day of October, 2004.